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# PATENT SPECIFICATION

Application Date: Nov. 26, 1925. No. 24,337/26.

Complete Accepted: May 26, 1927.

271,706

## COMPLETE SPECIFICATION.

### Improvements in Motive Fluid Generators for use particularly in Torpedoes.

I, FRANCESCO SCHMID, of Italian nationality, of 163, rue Margellina, Naples, Italy, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to motive fluid generators of the type in which water first circulates around a combustion chamber and is then directly mixed with the products of combustion being converted into superheated steam, the resulting mixture forming the motive fluid.

The invention consists in a motive fluid generator of the type referred to, characterised by concentric cylindrical annular chambers, namely, an outer annular chamber in which the feed water circulates and serving to absorb heat developed in an intermediate evaporating space, an inner annular chamber through which the feed water passes before being converted into steam by direct contact with the gases of combustion from the inner fuel combustion chamber, the resulting gaseous mixture passing thence from the said evaporating space to the exit.

The invention also consists in the shape given to the atomiser which assures perfect atomisation with easy ignition and good combustion.

In order that the invention may be more clearly understood reference will now be made to the accompanying drawing which represents diagrammatically a vertical sectional view of a generator.

Referring to this illustration K indicates a central combustion chamber into which enter air and atomised fuel and B an annular intermediate space with an evaporating chamber O, which former is surrounded by two annular water chambers M<sup>11</sup> and M having walls *t*, *t*<sup>1</sup> and S,

S<sup>1</sup> respectively; C represents the jet or atomising device which is fitted at the upper part of the fuel combustion chamber K. Ignition burners of any known form are fitted around the body of the atomiser and have communication at the openings D with the combustion chamber. The steam and hot combustion gases pass up through the intermediate space B to the exit pipe E which conducts them to the engine.

Air which has been stored in a high pressure container in the region of say 220 atmospheres is first reduced through a pressure reducer to about 70 or 80 atmospheres and is then admitted to the generator through a connection at the opening T at which pressure it is greater than that which is produced in the combustion chamber K. Fuel enters the heater through the pipe H while water enters by the pipe G.

When a torpedo fitted with such a generator is started, air enters by the pipe T and fills up the chamber N surrounding the atomising device C, a portion of this air passing through the holes *f* enters the atomising passage V which is shaped like a revolution hyperboloid at single fold—drawing along with it the fuel into the combustion chamber K which fuel having entered by the passage H passes through passages H<sup>1</sup> and into the annular chamber H<sup>11</sup> which connects with the passage V.

Areas and sizes are so devised that the air causes the fuel to be reduced to a fine spray and the resulting atomised mixture therefore is easily ignited by the flames of the ignition burners fitted in the chambers D. In addition, the other portion of the air forced through the pipe T flows from N through the holes I into the chamber K thus providing the

necessary air for completing the combustion.

As already mentioned the generator body is composed of two concentric annular chambers or vessels; the space M between the walls  $s$   $s^1$  of the outer chamber communicates by means of the upper chamber  $M^1$  with the space  $M^{11}$  between the walls  $t$ ,  $t^1$  of the inner chamber. Water entering through the pipe G first fills up the space M, thence passes through chamber  $M^1$  into  $M^{11}$ . Here, owing to the heat developed by the combustion flame, the temperature of the water rises so that when passing out through the holes  $e$ ,  $e$  into the chamber O and coming into contact with the hot air or gases from the combustion chamber K it is immediately evaporated. The resulting mixture which comprises highly superheated steam passes through the intermediate space B and the pipes E to the distributing chambers of the engine, the valves of which provide for admission to the cylinders. The exhaust gases from the engine pass away from the engine in the usual manner.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is

to be performed, I declare that what I claim is:—

1. A motive fluid generator of the type referred to, characterised by concentric cylindrical annular chambers, namely, an outer annular chamber in which the feed water circulates and serving to absorb heat developed in an intermediate evaporating space, an inner annular chamber through which the feed water passes before being converted into steam by direct contact with the gases of combustion from the inner fuel combustion chamber, the resulting gaseous mixture passing thence from the said evaporating space to the exit.

2. In an apparatus according to Claim 1, the provision of an atomising device in which the fuel is drawn by air or other gases which flow under pressure through hyperboloid shaped passages, assuring an intimate and thoroughly atomised mixture whereby easy ignition and good combustion results.

3. The motive fluid generator, substantially as described and as illustrated in and by the accompanying drawings.

Dated this 21st day of August, 1926.

MARKS & CLERK.

60-39.55

British 271,706

May 26 1927

271,706 COMPLETE SPECIFICATION

1 SHEET

[This Drawing is a reproduction of the Original on a reduced scale.]

